Safety Guidelines For Using The Desman© Laser And Dissuader® Laser To Disperse Double-crested Cormorants And Other Birds

Prepared For Wildlife Services Personnel

By James F. Glahn and Bradley F. Blackwell
National Wildlife Research Center

2000

Introduction

The Desman© and Dissuader® laser device are equally effective as pyrotechnics for dispersing double-crested cormorants from their night roosts (Glahn et al. in press) and may be the method of choice where disturbance of other wildlife is a concern (Blackwell et al. 2000, Glahn et al. in press). The Desman© is marketed for bird dispersal and the Dissuader is marketed as a threat deterrent security device. Both devices produce a red (633 to 650 nm wavelength) beam but are dissimilar with respect to type (helium neon vs diode), power and beam diameter. Although these devices do not present any detectable ocular hazards to cormorants (Glahn et al. in press), they do present some minimal human safety concerns (Blackwell et al. 2000, Glahn et al. in press). The purpose of this document is to review these human safety concerns and present guidelines for safe use of these devices that have shown to be effective in dispersing double-crested cormorants from their night roosts (Glahn et al. in press).

Human Safety Concerns

The principal hazard associated with laser radiation is thermal damage to eye tissue resulting from concentrated laser light energy on the retina (OSHA 1991). All lasers are classified based on their ability to cause eye damage based on power output measured at 20 cm from the laser head. The Desman© produces 5 mW (milliwatt) of power and is considered a Class-IIIB laser, which comprises lasers ranging from 5 to 500 mW. Thus, the Desman is at the extreme lower end of the power range of Class-IIIB lasers. The Dissuader® laser is marketed as a Class-II laser (lasers with power levels not above 1 mW). However, for purposes of safety, this document will treat both lasers similarly. Class-II lasers and lasers in lower ranges of Class-IIIB primarily produce an ocular hazard from direct viewing. However, spectral reflections from "mirror like" reflective surfaces can be equally as hazardous as direct viewing and should be minimized.

The American National Standards Institute and the Center for Devices and Radiological Health have each established Maximum Permissible Exposure limits for laser products based on exposure time. First is 0.25 seconds or the human aversion time or "blink reflex", which is the first line of defense against longer exposure. The second is 10 seconds, which is considered a "worst case scenario" for time of exposure. Based on these expected exposure times, the energy output, beam diameter and other parameters, a nominal hazard zone (NHZ) (also known as the nominal ocular hazard distance (NOHD)) can be calculated. For the Desman© laser, the NHZ Is 12.72 m considering the "blink Reflex" and 43.62 m considering a 10 second exposure (Soucaze-Soudat and Ferri 1997). The Dissuader® is eye safe considering the "blink reflex" but the NHZ is 25 m when considering a 10 second exposure (Dennis et al. 1999). Thus, there is no risk of eye damage at distances beyond 50 yards. This hazard zone considers only direct exposure to the unaided eye. Directly viewing laser beams with binoculars or other optical equipment greatly increases the hazard zone and should be avoided.

In addition to the potential for ocular damage, ***temporary vision impairment from laser exposure includes flash blindness, afterimage and glare***. Flash blindness is produced at

distances over 5 times the NHZ and is similar to the effect produced by photographic strobe lights. This impairment is transitory, lasting seconds to minutes depending on the laser exposure. Glare is similar to the effect produce by vehicle headlights at night. Afterimage is the perception of light or colored spots that may last for several minutes after laser exposure. **All these effects pose a safety hazard to pilots and operators of motor vehicles at distances well beyond the NHZ**, but only pose an annoyance to others not engaged in these activities.

Controlling hazards from low to moderately powered lasers is primarily administrative and procedural (OSHA 1991). The most important step is to define a controlled area that encompasses the NHZ for these devices -- for the Desman© and Dissuader® this is 50 yards. Other administrative controls include developing standard operating procedures and training for laser operators. The following guidelines, combined with user manuals for these devices, are intended to satisfy the OSHA requirement for a standard operating procedure. However, facilities using Class-IIIB lasers should designate a laser safety officer (OSHA 1991). Typically this would be a collateral duty of a supervisor responsible for the occupational health and safety of personnel involved in laser dispersal operations.

Safety Guidelines For Laser Dispersal Activities

Supervisors of field operations will be designated as laser safety officers for their respective operations and will be responsible for ensuring safe conduct of laser operations. The following procedures will facilitate the safe use of both the Desman© and Dissuader® laser for cormorant roost dispersal in rural areas. However, only the Dissuader® should be used in urban areas, particularly near airports. Because the Desman© and Dissuader® lasers might both be considered Class-IIIB lasers (Dennis et al. 1999), this protocol follows OSHA guidelines for Class-IIIB lasers (OSHA 1991).

All personnel using this equipment should have a thorough knowledge of the user manuals for these devices and consult with the laser safety officer before undertaking laser dispersal operations. Based on this consultation, the laser safety officer can provide additional training or safety equipment as appropriate.

Laser dispersal of cormorants can be achieved from shore or by boat. In both cases, ***make sure there are no personnel within at least 43 meters (~50 yards) between you and the birds in the trees (i.e., the hazard zone)***. To further control access of unauthorized personnel, standard laser warning signs should be posted at the boat ramp or other access points. Keep authorized personnel behind your firing position and do not allow them to view the demonstration with binoculars or spotting scopes.

While clearing the hazard zone of people, keep the Desman© trigger safety on and remove the batteries from the Dissuader© to avoid accidental discharge. Once the hazard zone is clear of people, aim the laser at the trees where the birds are roosting. ***Carefully point the beam either on the birds or on the trees and above human eye level.*** If movement of the beam is necessary to frighten birds, make horizontal, not vertical movements. ***To avoid uncontrolled spectral***

reflections of the beam, do not point the beam at the water surface or other "mirror like" reflecting surfaces. This could include reflection from glass surfaces in urban situations.

Although it is unlikely that low flying aircraft would be present after sunset in areas where cormorants roost, operators should be vigilant. High-flying aircraft (>1 mile away) should not be affected, but pointing of a laser beam at aircraft or other motorized vehicle should be avoided. If the sight or sound of aircraft, boat or other motor vehicle is detected approaching the roost, laser harassment should cease immediately.

Safe laser dispersal of other birds in a variety of settings is necessarily dependant on site conditions, particularly in urban areas. The exclusive use of the Dissuader® laser in urban situations should allow for safe use considering with the "blink reflex" it is eye safe (Dennis et al. 1999). Thus, the guidelines described for cormorant dispersal, with some modifications, may be applicable to most roosting bird problems. The exception to this may be at airports where WS personnel should not use lasers unless specific FAA approval is obtained.

In summary, both ***the Desman© and Dissuader® laser should be treated like a long-range firearm***, and operators should following firearm safety precautions, ***including storing these devices in a secured area, to avoid access to these devices by unauthorized personnel.*** Like using firearms, the operator should consider background, range of "projectile" (beam) and ricochets (reflections).

References

ANSI (American National Standards Institute). 1993. American National Standard for the Safe Use of Lasers. ANSI-136.1.

Blackwell, B. F., G. E. Bernhardt, and R. A. Dolbeer. 2000. Wildlife control methods for airports (Task 3). Experiment 1: Lasers as non-lethal avian repellents. Interim report submitted to DOT/FAA, William J. Hughes Technical Center by USDA/WS/NWRC.

Dennis, J. T., J. T. Harrison, W. E. Wallace, R. J. Thomas and S. R. Cora. 1999. Visual effects assessment of the Dissuader laser illuminator. United States Air Force Research Laboratory Report. AFRL-HE-BR-TR-1999-0179.

Desman, S.A.R.L. 1996. Laser gun Model FL R 005 user manual. Desman, S.A.R.L., France.

Glahn, J. F., G. Ellis, P. Fiornelli and B. S. Dorr. In press. Evaluation of moderate- and low-powered lasers for dispersing double-crested cormorants from their night roosts. Proc. Eastern Wildl. Damage Control Conf. 9:

OSHA. 1991. Guidelines for laser safety and assessment. Publication 8-1.7. U.S. Department of Labor, Occupational Health and Safety Administration.

Soucaze-Soudat, J. D. And M. Ferri. 1997. A means of scaring birds: the laser gun, description and applications to cormorants and other birds. Desman© S.A.R.L, France in cooperation with the office of Wildlife Protection and Regulation of Hunting and Fishing, Modena Province Regione Emilia Romagna, Italy.